

VARIATION OF LACAILLE 5861

BY ALEX. W. ROBERTS.

This star, the position of which is—

R.A. 14 h. 8 m. 10·2 s. (1875)

Dec. — 57° 16' 12"

is a variable of an extremely rare type. Only one other star of the same nature of variations is known, namely, *U Pegasi* (Chandler 8598).

The peculiarity about these two stars is that their decreasing period is slightly shorter than the increasing period; with all other variable stars the rise to maximum brightness is much more rapid than their fall to minimum. Both stars also vary in a remarkably short time, the period of L 5861, being 7 h. 16 m., and of *U Pegasi* 5 h. 22 m.

This is the shortest period known, and accordingly extreme rapid variation might be claimed as a second characteristic of this type. This may, however, be an accident, as the variation of some other short period variables falls not very far short of this, notably the southern variable, *S. Antliæ*, period 7 h. 56 m.

The slow rise to maximum is however so definite and unmistakable a characteristic, that it must be taken as the main point of difference between these two stars and all the other short period variables, some 45 in number.

U Pegasi was discovered by Chandler, of Harvard, towards the close of last year; L 5861 was discovered at Lovedale in April of this year. Since then it has been regularly observed, the number of observations made being considerably over 500.

The range of variation is very slight, only 0·4 magnitudes—an amount that to an untrained eye would be almost imperceptible.

As already said, the star goes through all its variations in seven hours and a quarter, passing in this time from its maximum brightness down to its minimum, and up again to its maximum. There is no halt at any stage, variation is constantly going on.

One naturally wonders as to the cause of such perplexing light

variation. To any such inquiry unfortunately no definite answer can be given.

We can only assure ourselves of a series of negations.

1. *The light variation of L 5861 is not due to eclipse.*

If that were so there would be periods of rest, during which the light of the star would remain constant. But no such stationary periods have been observed.

2. *L 5861 cannot be a large star.*

If so the two possible theories of light variation, rotation and revolution, would not be tenable. The latter could not exist; two large bodies could not revolve round one another in six hours; the former would end in the disruption of the star.

3. *The light variation of L 5861 arises from some mechanical, not chemical source.*

The period of maxima and minima are of extreme regularity, and the limits or amplitude of variation is of a certain fixed latitude. With variables, where spectroscopic examination indicates chemical change synchronous with the light variations, regularity of period and of amplitude is wanting, as we might naturally expect.

No chemical changes through unstable combination of the constituents of the star's upper atmosphere could alternate with the precision of an observatory clock.

4. *The changes are not deep-seated.*

No body could, as a whole, alternate through extremes of light and shade in periods of six hours. The changes are consequently surface phenomena, probably tidal in their nature. An upper viscous shell covering a solid globe would, under tidal forces, generate by friction enough heat at high tide to cause the change of light observed on either L 5861 or U Pegasi.

The conditions of variation would be, in that case, two stars revolving round one other in close proximity in a period of twelve or fourteen hours. The mutual attractions of the two spheres would produce two giant tides in each star, which as they passed over the more solid nucleus underneath would generate heat, and so give rise to an increase of brightness.

An examination of the star's relative position might indicate a sensible parallax, and thus we might be able to compare its light with that of stars whose distance is known.

The whole subject of stellar variation is one of no common interest; and now that spectroscopic researches at Potsdam and Harvard have established a relationship between stellar variation and double stars, the interest is accentuated.

For the determination of the orbital movement of variable stars, the finest instruments, the most refined mechanism are required. For the determination of the light variation a good pair of eyes is all that is needed.

I have added this last sentence with the hope that some one in the Society may feel inclined to undertake work that now needs the full energies of half a dozen men to do it justice.

Six years ago the number of southern variables stood at :

Algol variables	0
Short period variables.....	4
Long period variables	10

These formed pleasant occupation for one man, and time enough and to spare to seek for more.

The numbers now are :

Algol variables	4
Short period variables.....	20
Long period variables	55

And when the results of that remarkable work the "Cape Durchmusterung" are published, these numbers will be largely increased.

There is thus need for more workers, and it is to be hoped that this appeal which I make on behalf of one of the most interesting sections of astronomical work will not go unanswered.

Addendum to note on New Variable in Centaurus.

I have just received a communication from Professor Pickering, Harvard, which has an important bearing on a conclusion come to in the paper on the new variable in Centaurus. I there state that I am loath to accept rapid variation as a characteristic of the new class of variables, as S. Antliæ varies in a period of 7 h. 47 m. Professor Pickering finds that S. Antliæ is of the same type as U Pegasi, and consequently of the same type as L 5861, the new variable star. His observations, which were made with the Harvard photometer, are very numerous, and apparently conclusive.

It is pleasant to find, instead of an anomaly, such complete agreement with what theory would lead one to expect; but of far more importance than this agreement is the outlook which these recent discoveries present. It needs little prevision to state that

they cannot be exhaustive, but that instead, now that astronomers know what to look for, they are the first of a long series of such discoveries.

The three stars which belong to this type now are :

Star.	Period.	Variation.	Authority.
S. Antliæ	7 h. 47 m.	0·6 m.	Pickering
U Pegasi	5 h. 32 m.	0·6 m.	Chandler
L 5861	7 h. 16 m.	0·4 m.	Roberts